

# *Programming for Robotics*



**Newbury Park High School 2016**

# The *Hello World* of Robotics

PFR.01.02

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20160922

- Robot Configuration
- Controller Configuration Window
- Digital In vs Out
- LCD Messages
- LCD Buttons
- Conditionals

# Learning Objectives

Terminal = What you walk away with  
Enabling = What you will be evaluated on

## Terminal Learning Objectives

- Understand the importance of Tele-op program versus Auto program.
- Understand the Controller Configuration window and how it relates to the programming environment.
- Understand how the LCD screen and buttons work in relation to EasyC, and can properly program messages and button input.
- Understand what conditional statements are and how to use them

## Enabling Learning Objectives

- Ability to create a new program from scratch that is for autonomous code
- Ability to correctly use the Controller Configuration window
- Ability to display messages on the LCD screen
- Ability to receive input from LCD screen buttons
- Ability to complete a task based on a conditional statement with an input as a parameter



Button



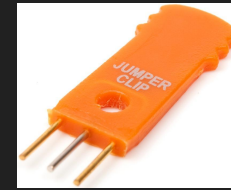
Limit Switch



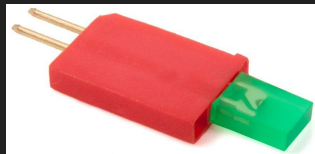
Ultrasonic



Encoder



Jumper



LED



Speaker



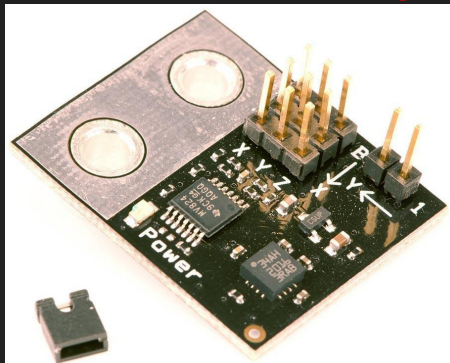
Line Follower



Light Sensor



Potentiometer



Accelerometer (left) which has 3 spots for pwm cables, and Gyro (right) which has 1 spot for a pwm cable.

Both have their name printed on the back.

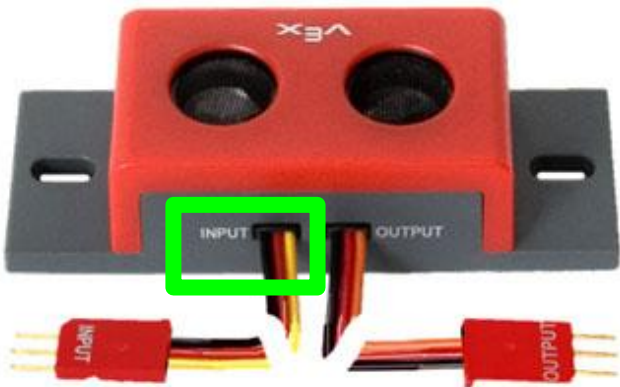


# Configuration

Ultrasonic In cable port 3  
Out cable in port 4

Encoder cable A or B  
does not matter.

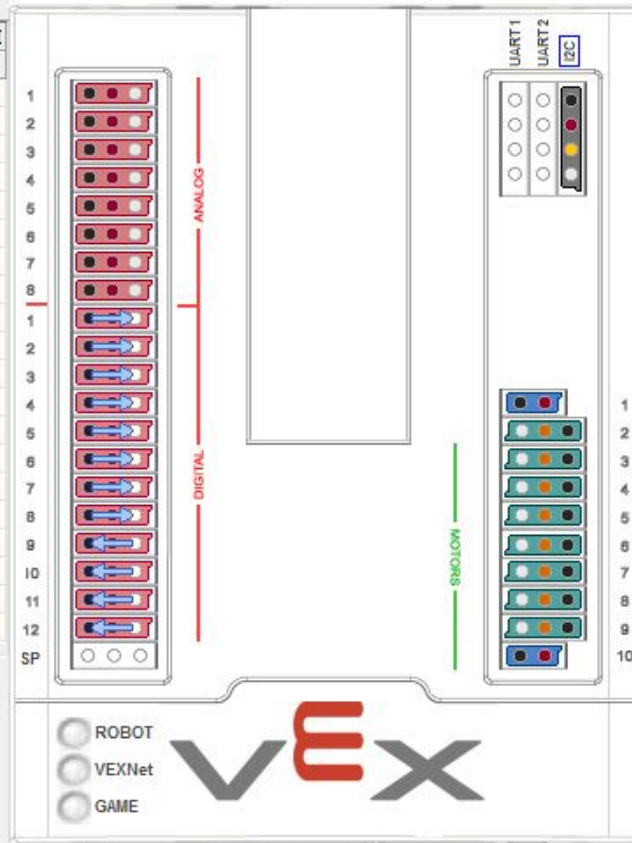
Flashlight is 2 wire and  
goes in port 1



Digital I/O		Analog I/O		Motors	
1	Button	1	Left Line Follower	1	Flashlight
2	Limit Switch	2	Middle Line Follower	2	Left Drive Motor
3	Ultrasonic (Input)	3	Right Line Follower	3	Right Drive Motor
4	Ultrasonic (Output)	4	Light Sensor	4	Arm Motor
5	Right Encoder	5	Potentiometer	5	Claw Servo
6	Right Encoder	6	X - Accelerometer	6	n/a
7	Left Encoder	7	Y - Accelerometer	7	n/a
8	Left Encoder	8	Gyro	8	n/a
9	Jumper			9	n/a
10	Green LED			10	n/a
11	Yellow LED				
12	Red LED				
SP	Speaker				

UART1	UART2	I2C
LCD Display	n/a	n/a

ANALOG & DIGITAL	
#	ANALOG & DIGI Description
1	
2	
3	
4	
5	
6	
7	
8	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	



INTEGRATED MOTOR ENCODERS		
I2C #	Motor Port #	Description
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	8	
9	9	
10	10	

MOTORS		
#	Motor Type	Description
1	n/a	
2	n/a	
3	n/a	
4	n/a	
5	n/a	
6	n/a	
7	n/a	
8	n/a	
9	n/a	
10	n/a	

## Motor Type Information

n/a - Motor Type is not provided  
 Standard - Motor Module without Integrated Encoder  
 Small IME - 269 with Integrated Encoder  
 Big IME - 393 with Integrated Encoder  
 Big IME HS - 393 High Speed Gearing with Integrated Encoder

Left-Click to set Digital I/O

Restore Defaults

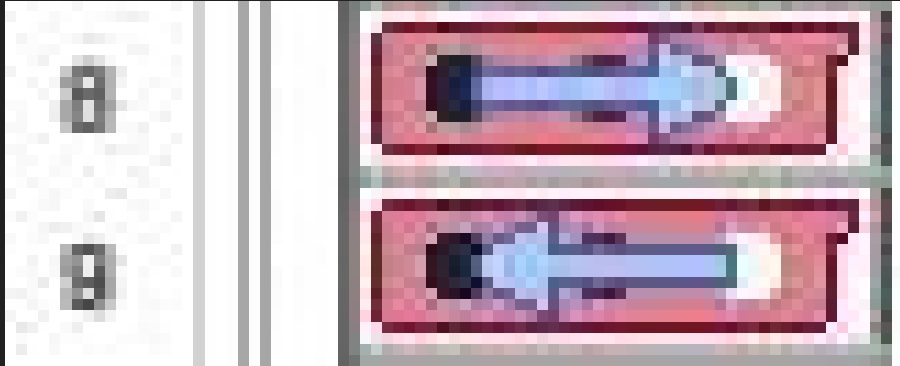
OK

Cancel

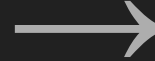
Help

# Configuration

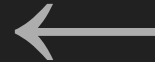
## Input vs Output



The plug pointing inward towards the brain



Is an INPUT signal, while pointing away

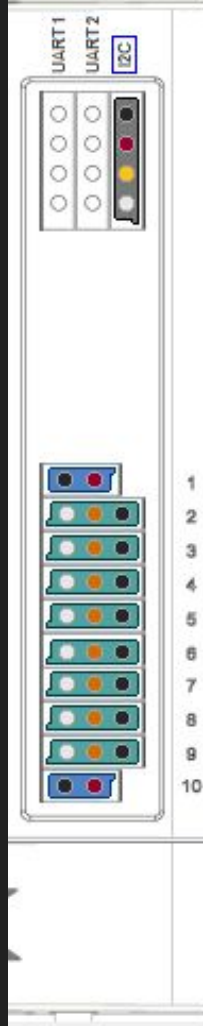
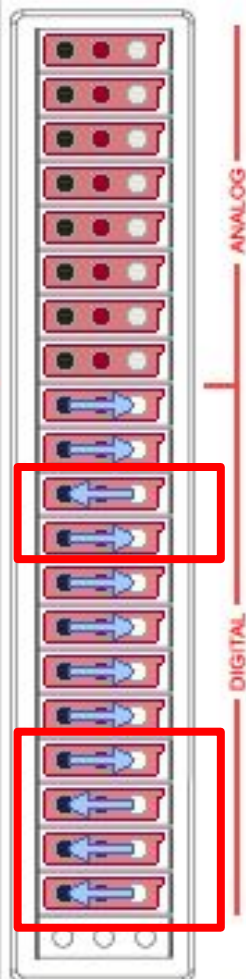


Is a digital OUTPUT, used typically for Ultrasonic sensors and LEDs.



ANALOG & DIGITAL	ANALOG & DIGI
#	Description
1	lLineFollower
2	mLineFollower
3	rLineFollower
4	lightSensor
5	potentiometer
6	xAccelerometer
7	yAccelerometer
8	gyro
1	button
2	limitSwitch
3	ultrasonicIn
4	ultrasonicOut
5	rightEncoder1
6	rightEncoder2
7	leftEncoder1
8	leftEncoder2
9	jumper
10	greenLED
11	yellowLED
12	redLED

1  
2  
3  
4  
5  
6  
7  
8  
1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
SP



MOTOR	INTEGRATED MOTOR ENCODERS	
I2C #	Motor Port #	Description
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	8	
9	9	
10	10	

MOTORS	MOTORS	
#	Motor Type	Description
1	n/a	flashlight
2	Standard	lDrive
3	Standard	rDrive
4	Standard	arm
5	Standard	claw
6	n/a	
7	n/a	
8	n/a	
9	n/a	
10	n/a	

#### Motor Type Information

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# LCD Screen Details

Information (technical) on LCD screen

Dec	Hx		Dec	Hx		Dec	Hx		Dec	Hx		Dec	Hx		Dec	Hx		Dec	Hx		Dec	Hx	
16	10	±	48	30	0	80	50	P	112	70	P	144	90	é	176	B0	.	208	D0	M	240	F0	T
17	11	≡	49	31	1	81	51	Q	113	71	q	145	91	æ	177	B1	"	209	D1	t	241	F1	U
18	12	∇	50	32	2	82	52	R	114	72	r	146	92	Æ	178	B2	*	210	D2	s	242	F2	V
19	13	/	51	33	3	83	53	S	115	73	s	147	93	ö	179	B3	'	211	D3	¶	243	F3	W
20	14	/	52	34	4	84	54	T	116	74	t	148	94	ö	180	B4	`	212	D4	Γ	244	F4	Ω
21	15	ℓ	53	35	5	85	55	U	117	75	u	149	95	ö	181	B5	½	213	D5	∫	245	F5	Υ
22	16	ℓ	54	36	6	86	56	V	118	76	v	150	96	ö	182	B6	¼	214	D6	Θ	246	F6	ϕ
23	17	J	55	37	7	87	57	W	119	77	w	151	97	ö	183	B7	×	215	D7	Α	247	F7	ϕ
24	18	/	56	38	8	88	58	X	120	78	x	152	98	ö	184	B8	÷	216	D8	Σ	248	F8	Ρ
25	19	ℓ	57	39	9	89	59	Y	121	79	y	153	99	ö	185	B9	£	217	D9	Π	249	F9	ϕ
26	1A	≈	58	3A	:	90	5A	Z	122	7A	z	154	9A	ö	186	BA	ℓ	218	DA	Σ	250	FA	F
27	1B	ℓ	59	3B	;	91	5B	[	123	7B	ç	155	9B	ö	187	BB	⊗	219	DB	†	251	FB	ϕ
28	1C	=	60	3C	<	92	5C	\	124	7C	l	156	9C	ö	188	BC	⊗	220	DC	⊗	252	FC	□
29	1D	ω	61	3D	=	93	5D	]	125	7D	o	157	9D	ö	189	BD	≠	221	DD	Ψ	253	FD	=
30	1E	2	62	3E	>	94	5E	^	126	7E	~	158	9E	ö	190	BE	√	222	DE	Ω	254	FE	⊗
31	1F	3	63	3F	?	95	5F	_	127	7F	Δ	159	9F	ö	191	BF	¬	223	DF	α	255	FF	⊗
32	20		64	40	@	96	60	`	128	80	Ç	160	A0	ä	192	C0	ı	224	E0	β			
33	21	!	65	41	A	97	61	a	129	81	ü	161	A1	i	193	C1	J	225	E1	γ			
34	22	"	66	42	B	98	62	b	130	82	é	162	A2	ö	194	C2	ø	226	E2	δ			
35	23	#	67	43	C	99	63	c	131	83	ä	163	A3	ü	195	C3	P	227	E3	e			
36	24	\$	68	44	D	100	64	d	132	84	ä	164	A4	é	196	C4	ϕ	228	E4	z			
37	25	%	69	45	E	101	65	e	133	85	ä	165	A5	é	197	C5	↑	229	E5	n			
38	26	&	70	46	F	102	66	f	134	86	ä	166	A6	é	198	C6	↓	230	E6	θ			
39	27	'	71	47	G	103	67	g	135	87	ç	167	A7	é	199	C7	→	231	E7	ℓ			
40	28	(	72	48	H	104	68	h	136	88	é	168	A8	é	200	C8	←	232	E8	κ			
41	29	)	73	49	I	105	69	i	137	89	é	169	A9	i	201	C9	Γ	233	E9	λ			
42	2A	*	74	4A	J	106	6A	j	138	8A	é	170	AA	ä	202	CA	∩	234	EA	μ			
43	2B	+	75	4B	K	107	6B	k	139	8B	i	171	AB	ä	203	CB	L	235	EB	ν			
44	2C	,	76	4C	L	108	6C	l	140	8C	i	172	AC	ö	204	CC	J	236	EC	ξ			
45	2D	-	77	4D	M	109	6D	m	141	8D	i	173	AD	ö	205	CD	.	237	ED	π			
46	2E	.	78	4E	N	110	6E	n	142	8E	ä	174	AE	ö	206	CE	0	238	EE	ρ			
47	2F	/	79	4F	O	111	6F	o	143	8F	ä	175	AF	ö	207	CF	0	239	EF	σ			

# Creating the Template

Wait for lcd screen button press before starting  
robot code

# Variables

Insert get button watcher and discuss why we need variables, then a while loop

Char vs int

# Comparisons and Conditionals

If/While/Else

`==, !=, ||, &&, =, !`

If  $(lcd1+2+3 \neq 0)$  then at least one is pressed

fin

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